to the Boundary Commission, has been engaged in continuing the examination of the region in the vicinity of the 49th parallel. Prof. Bell has been again engaged during the past summer in the North-west Territories. Mr. Henry G. Vennor spent the greater part of the summer in extending his researches through the rear portion of Lanark County, Ont., and towards the end of the season had succeeded in working out the geological structure of the whole of it. Further details are given concerning laboratory and other work done during the year by various scientific workers, all showing considerable activity in science on the part of the Canadians.

THE following are the probable arrangements for the Friday Evening Lectures at the Royal Institution after Easter:—April 9, Sir William Thomson, LL.D., F.R.S.: "Tides." April 16, Prof. Gladstone, F.R.S., M.R.I.: "Progress of Science in Elementary Schools." April 23, Prof. Ramsay, LL.D., F.R.S.: "The Pre-Miocene Alps, and their subsequent Waste and Degradation." April 30, Walter Noel Hartley: "Action of Heat on Coloured Liquid." May 7, M. Cornu (École Polytechnique): "Velocity of Light." May 14, John Evans, F.R.S.: "Coinage of the Ancient Britons and Natural Selection." May 21, J. Baillie Hamilton: "Application of Wind to Stringed Instruments." May 28, Col. Lane Fox, M.R.I.: "Evolution of Culture."

THE additions to the Zoological Society's Gardens during the past week include a Lesser Sulphur-crested Cockatoo (*Cacatua sulphurea*) from Moluccas, presented by Mr. H. W. Wood; an Annilated Snake (*Leptodira annulata*) from Jamaica, presented by Mr. H. B. Whitmarsh; a Diana Monkey (*Cercopithecus diana*) from West Africa; a Common Rhea (*Rhea americana*), three Snowy Egrets (*Ardea candidissima*), a Common Boa (*Boa constrictor*) from South America, purchased.

SCIENTIFIC REPORT OF THE AUSTRO-HUNGARIAN NORTH POLAR EXPEDITION OF 1872–74 *

III.

DURING winter the air seemed always to contain particles of ice; this was seen not only by parhelia and parselenæ when the sky was clear, but also in astronomical observations. The images of celestial objects were hardly ever as clear and well defined as they are at home, although the actual moisture in the atmosphere was far less. It happened very often that with a perfectly clear sky needles of ice were deposited in great quantities upon all objects. It was quite impossible to determine the quantity of atmospheric deposits, as during the snowstorms no distinction could be made between the snow actually falling and that raised from the ground by the storm; it was remarkable, however, that during the first winter the quantity of snow was small compared with that of the second winter, when the snow almost completely buried the ship (this happened near Franz-Joseph's Land). The same proportion was repeated in the quantity of rain during the first and second summer; in the first only a little rain fell late in the year, while in July 1874 it rained in torrents for days.

Clouds are naturally of a very different character from those seen at home; nimbus and cumulus are never seen. The form of cloud is either that uniform melancholy grey of an elevated fog, or cirrhus; the latter consists of round but undefined masses of fog at but a small elevation, therefore somewhat different from the cirrhus of the temperate zone. Instead of clouds, fogs are prevalent, now higher, now lower, and twenty-four hours of clear weather rarely occur during the summer; generally the sun is seen for a few hours, then to disappear again behind the thick fogs. Melancholy and depressing as the effect of these eternal fogs may be, they are nevertheless necessary for the general conditions of the ice; they form the binding media for the heat of the sun's rays, and melt more ice than the direct rays.

Parhelia and parselenæ were often observed; they always were certain indications of snowstorms that followed them. A new phenomenon was only observed once, when, besides the double system of parhelia, two other mock suns appeared on the same altitude with the real sun.

On the whole path which the vessel described soundings were made constantly, and the depth of the sea was found to increase towards the east; on the easternmost point, 73° E. long., there were 400 metres of water, and the depth steadily decreased towards the west. In front of Franz-Joseph's Land there is a bank which seems to reach as far as Nowaja Semlja; beyond it the depth increases again. The whole area east of Spitzbergen rarely exceeds 300 metres in depth. Lieut. Hopfgarten specially constructed an instrument to fetch up dredgings, which was frequently done. The deep-sea temperatures were measured with Casella's minimum and maximum thermometer, and these measurements were continued throughout the winter. They showed a slight increase in the temperature at the bottom. The percentage of salt in the sea-water at different depths was also determined. Until the ship was blocked up the surface temperatures of the sea were also measured. Lieut. Weyprecht thinks that, as a rule, too much importance is attached to these, as the state of the weather is not taken into account, and it is just that which has the greatest influence upon the surface temperature; it is quite wrong to imagine the existence of currents from observations of this kind.

During their drift the explorers made good use of the dredging net; it was generally kept on the bottom during half a day, and thus areas of several miles' extent were examined. The collection obtained in this way no doubt completely represents the fauna on the bottom of the sea which the explorers visited. At places animal life was so plentiful that the net came to the surface completely filled. Crustaceæ were particularly plentiful; unfortunately the larger specimens remained in the ship, as they could not be transported. Dr. Kepes has handed the valuable collection to the Imperial Academy of Sciences (Vienna), and specialists are now busily engaged upon it. Other collections had to remain behind, but were not very valuable, as the explorers only touched land during winter, when everything was covered with snow; they certainly possessed a rather complete collection of birds, but these were all known species, with the sole exception of a Lestris, which Dr. Kepes could not define. Of great value, however, were sixty-seven bearskins, which had already been prepared and well packed; there were some splendid skins amongst them, most of them winter skins, which are rarely obtained in trade and are much finer than the summer skins.

Higher animal life is rather limited in those regions; the principal representatives are the polar bear and the seal, the former in such numbers that the explorers could never leave the ship without weapons; he caused them many a disagreeable surprise, but was always a welcome guest, as he provided them with a fresh and strengthening repast. The seal, in two species, *Phoca barbata* and *Phoca grœnlandica*, is everywhere where open water appears between the ice, although not in such quantities that seal-hunting would pay. The walrus was only seen once, not far from Franz-Joseph's Land, although the explorers often passed over good walrus-ground. Of whales they only saw one species in the vicinity of coasts, where it was very frequent.

Birds were very numerous near the land, but the further the ship drifted away the scarcer they became, and during the last part of the explorers' retreat in the ice the appearance of a bird was a rare phenomenon.

Interesting as all these observations doubtless may be, and in spite of the numerous and long tables they contain, they yet do not possess that high scientific value which might be reached under different circumstances. They only give us a picture of the extreme *effects* of natural forces in the Arctic districts, but on their *causes*, the *why*, we are just as much in the dark as before; and the reason of this lies in the fact that there are no simultaneous observations in another district for comparison. Only when we possess those shall we be enabled to make correct conclusions as to the causes, the origin, and the nature of the abnormal phenomena in the Arctic Zone. The keys to many enigmas in nature, which for centuries it has in vain been tried to solve—such as those in terrestrial magnetism, electricity, and the best part of meteorology, &c.—are doubtless hidden near the poles of the earth; but as long as polar expeditions are nothing more than an international race in honour of one or another flag, having as principal object only to get a few miles nearer to the pole than the last explorers, so long these enigmas will most decidedly remain unsolved.

Pure geographical research, *i.e.* Arctic topography, which until

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* Die 2. Oesterr.-Ungarische Nord Polar Expedition, unter Weyprecht und Payer, 1872–74. (Petermann's Geogr. Mittheilungen, 1875; heft ii.) (Continued from p. 398.)

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now was foremost with all polar expeditions, must recede before the far more important scientific questions. But these questions cannot be answered before all nations that claim a place at the head of civilisation leave aside all national rivalry, and resolve to make progress together in this direction. To obtain decisive scientific results, a number of simultaneous expeditions are absolutely necessary, and their object must be to collect or construct tables of yearly observations at different points round the pole, but their instruments and method of observation should be exactly alike. Only when this is done will the materials be furnished for the solution of those great problems of nature which are now mysteriously enwrapped by Arctic ice; only then will we reap the benefit of that enormous capital of labour, efforts, sufferings, and money which until now have been wasted in the polar district.

With regard to the means to reach the highest latitude, the camp of explorers is divided into two; some are in favour of ships, others expect everything from sledges. As long as it is the *principal* object of an expedition to reach high latitudes, sledges are doubtless preferable, but when higher results are aimed at, only ships can give the necessary basis to work upon. It is a great illusion to imagine that both can be perfectly united; on the contrary, one will always have to be subservient to the other, and they will generally be hindrances to each other.

Finally, Lieut. Weyprecht tenders his thanks to the officers of the expedition, whose untiring efforts and energy, frequently under the most difficult and sometimes the most dangerous circumstances, alone made it possible to present the scientific world at home with the above data of observations and results.

SCIENTIFIC SERIALS

THE *Journal of the Chemical Society* for February 1875 contains two original papers by Mr. A. H. Church. The first is on the composition of autunite. The recent discovery of a new locality in Cornwall for autunite induced Mr. Church to make a fresh examination of this mineral species. The quantity at his disposal was rather small, but as a remarkable peculiarity concerning the condition of the water in this mineral presented itself, the author availed himself of two fine French specimens. The Cornish specimens occurred in thin isolated rhombic tables, translucent to sub-transparent, and were sulphur-yellow. We then have a minute description of the analysis made, and in conclusion Mr. Church finds the formula of autunite, as it exists in the unaltered crystals, to be $\left.\begin{matrix}U_2O_3\\CaO\end{matrix}\right\} P_2O5 \cdot 10H_2O$, whereas autunite dried in vacuo is $\left.\begin{matrix}U_2O_3\\CaO\end{matrix}\right\} P_2O_5 \cdot 2H_2O$. Upon examination of the closely allied uranium copper phosphate, *torbernite*, it did not show analogous results, and the author found the formula of torbernite to be $\left.\begin{matrix}U_2O_3\\CuO\end{matrix}\right\} P_2O_5 \cdot 8H_2O$ and $\left.\begin{matrix}U_2O_3\\CuO\end{matrix}\right\} P_2O_5 \cdot 2H_2O$ respectively; the latter, if the mineral is dried at 100°. Mr. Church considers, in conclusion, that there are cases in which the drying of minerals in vacuo removes essential water, and not accidental moisture only; and he further believes that absolutely dry air does, in still rarer instances, effect a similar alteration.—The second paper is on the action of baryta on oil of cloves. Considerable differences existing amongst chemists on the action of caustic baryta on eugenol, the author repeated experiments he had made some time ago on a larger scale, and with eugenol from oil of cloves of ascertained genuineness. The author first gives a description of experiments as to the physical characters of pure eugenol itself, and of the terpine with which it is associated in clove oil. We then come to the experiments with baryta, and their result was the conclusion that the action of baryta on eugenol is not a precise or definite one; that a greater part of the eugenol is carbonised and destroyed, and that from the products of such destruction a minute proportion of the remaining eugenol receives an addition of CH_2, becoming thereby converted partly into methyl-eugenol and partly into another body of the same empirical formula, and possibly isomeric with the ether. It is clear, therefore, that none of the former conclusions as to the nature of the action of baryta on eugenol are correct.—The remainder of the journal is dedicated to abstracts of papers published in other journals, many of which have already been noticed in these columns.

American Journal of Science and Arts, February.—The first paper in this number is Prof. Asa Gray's address on Jeffries Wyman at the Memorial Meeting of the Boston Society of Natural History, Oct. 7, 1874, to which, as well as to the subject of it, we have already referred.—On some points in the geology of the Blue Ridge of Virginia, a paper by Mr. W. M. Fontaine, is concluded in this number.—Mr. J. D. Dana reviews Dr. Sterry Hunt's "Chemical and Geological Essays," and Prof. Asay Gray contributes a short paper on the question, "Do varieties wear out?" The conclusion which he reaches we gave in a recent number (vol. xi. p. 334). In "Communications from the laboratory of Williams College," Mr. Ira Remsen treats of (1) the formation of paratoluic acid from parasulphotoluenic acid; (2) nitro-parasulphobenzoic acid; and (3) the action of potassium on ethyl succinate.—Another chemical paper is by Mr. M. Carey Lea on the detection of hydrocyanic acid.—M. A. E. Verrill sends his thirtieth contribution to zoology, from the museum of Yale College; it treats of the gigantic cephalopods of the North Atlantic, and is illustrated with some good cuts.—Among the smaller notes is a useful summary of the results obtained at twenty-six transit stations, twenty in the northern and six in the southern hemisphere.

Transactions of the Geological Society of Manchester, vol. xiii., part 7.—The papers in this part are—the President's (Prof. W. Boyd Dawkins) address on the most important additions during 1873–74 to our knowledge in those departments of geology that relate to mining, engineering, and terrestrial physics; "Fish Remains from the Coal Measures," by Mr. John Aitken, F.G.S.; "Geology of the Parish of Halifax," by Mr. James Spencer.

Memorie della Societa degli Spettroscopisti Italiani, Dec. 1874.—Father Secchi writes on the physical study of the comets Coggia and Tempel 1874. He appears to have spectroscopically examined these comets on every opportunity, and to have compared their spectra with a Geissler's tube in front of the object-glass. He found the spectra of a hydrocarbon gas did not correspond with that of the comet; the brightest band of the spectrum of HC_2 is in the blue, while that of the gas CO or CO_2 is in the green, just as in Coggia's comet. On the other hand, the blue band is the brightest in the spectrum of Tempel's comet; and Secchi therefore attributes its light to a hydrocarbon. The nucleus appears to have given off polarised light, and also the surrounding portions of the comet. On July 9 the continuous spectrum of the nucleus appeared broken for a short distance on the red side of each of the hydrocarbon bands. On Sept. 5 Borrelly's comet appeared to have a number of bright points of nuclei dispersed throughout the comet.

Astronomische Nachrichten, No. 2,021.—Julius Schmidt communicates the observations on the number of sun-spots seen every available day at Athens. The average number of groups in January seems to be about five; in April it had decreased to two, and this average remained nearly constant throughout the remainder of the year. Position observations of Coggia's comet, by J. Dreyer, of Birr Castle, and the discovery of Planet 141, by Paul Henry, appear in this number. The transit of Venus appears to have been seen well at Java, by Metzger; the different appearances at various times during the transit are given. The eclipse of the sun was observed at Leipzig in January. It appears from the observations of the ends of the eclipse that the last contact was seen with the larger apertures before it was so seen with the smaller one.

Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie, Jan. 15.—The first paper is a contribution by Dr. Hildebrandsson to the question of the condition of vapour in the atmosphere, founded on researches made by him and Prof. Rosen some years ago, and not before published, to his knowledge, beyond Sweden. Le Roy started, and Saussure accepted the theory, that air dissolves water or vapour as a fluid dissolves a salt. Wallerius, de Luc, and Dalton, on the other hand, were of opinion that vapour is formed through the action of heat exactly in the same way in a vacuum as in air. Since the demonstrations of Regnault, the latter view has been generally adopted. By experiments resembling those of Rudberg and Regnault, Dr. Hildebrandsson and Prof. Rosen came to the following conclusions:—1. If a gas or vapour of water be brought (mechanically or by evaporation) into a volume of gas, this volume is immediately compressed or shoved aside until the difference in pressure is annulled. 2. If a gas or vapour of water be taken (mechanically or by condensation) from a volume of gas, this volume of gas rushes in from all sides to fill up the vacuum or equalise pressure. The condensation of vapour therefore doubtless plays a large part in the origin and propagation of storms,

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